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HDL KNX / EIB-BUS

(Intelligent Installation Systems)

Product Manual

Contents

1 General.....4
1.1 Product Function.....5

2 Hardware.....6
2.1 Technical data.....6
2.2 Dimension drawings.....9
2.3 Wiring diagram.....9
2.4 Maintenance and Cautions.....11

3 Software.....12
3.1 Database functions overview.....12
3.2 Object/Association/Group address define.....13
3.3 Function parameter “General”.....14
3.4 Function parameter Channel “N”.....15
3.5 Channel mode “Switch Actuator”.....15
3.5.1 Channel function.....17
3.5.2 Channel function parameter.....18
3.5.3 Channel function “time”.....20
3.5.3.1 Channel function “time-Flashing”.....21
3.5.3.2 Channel function “time-Staircase lighting”.....22
3.5.3.3 Channel function “time-ON/OFF delay”.....24
3.5.4 Channel function “scene”.....25
3.5.5 Channel function “threshold”.....27
3.5.6 Channel function “curtain”.....29
3.5.7 Channel function “logic”.....31
3.5.8 Channel “Heating Actuator”.....34

4 Communication objects description……37
4.1 Objects“General” and “Ouput N”……37
4.2 All objects with channel “N”……37
4.2.1 Objects“Respone”……38
4.2.2 Objects“Read/write statistics ON time”……38
4.2.3 Objects“Change staircase lighting time” ……38
4.2.4 Objects“Warning staircase lighting” ……38
4.2.5 Objects“Scene”……39
4.2.6 Objects“Threshold”……40
4.2.7 Objects“Curtain” ……40
4.2.8 Objects“Logic”……41
4.2.9 Objects“Heating”……41

5 Application……42
5.1 Program functions diagram……42
5.2 Scene……43
5.3 Threshold……43
5.4 Curtain……44
5.5 Logical function ……45
5.6 PWM control ……46

1-General

HDL KNX / EIB series switch actuator output modules are developed by HDL. Using KNX/EIB BUS communicate with other KNX devices. Database need to be downloaded to the switch actuator by using ETS2 V1.3/ETS 3.0, The document descript how to use the products . Our products use standard according to EMC, electrical safety, environmental conditions.

The switch actuators are used to control switched loads, such as:

* **Lighting**
* **Motor**
* **Curtain**
* **Heating**
* **Other Equipments**

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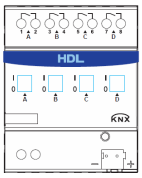
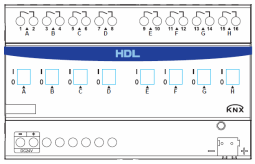
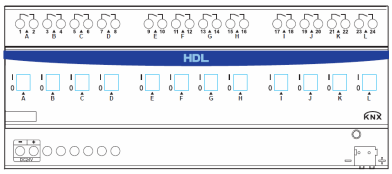
1.1-Product Function


M/R4.16.1


M/R8.16.1


M/R12.16.1

The switch Actuators can switch for 4, 8 and 12 channels independent AC/DC loads. The outputs for MAX 16 A be switched ON or OFF on every output channel and can manually switch also. The M/R4.16.1 no need require an additional power supply. The M/R8.16.1,M/R12.16.1 require an additional 24VDC power supply if need frequently operation all of channel same time, but normal operation is good also if there is no additional power supply. The following functions can be set individually for each output channel:

1-Channel s tate response.
2-Channel state after bus voltage failure and recovery
3-Time function
* Flashing
* Staircase light
* Delay
4-Scene
* scene number:1-64
5-Threshold
* Two threshold value
6-Curetain
* top/left<->bottom/right
7-Logic
* AND/OR/XOR/GATE
8-Heat control
* PWM

The type of the switch Actuator Description as following:

M/Rx.y.z

* x=channel number
* y=Current 16A/channel
* z=Application Version

2- Hardware

The technical properties of HDL KNX/EIB Switch Actuators as the following sections.

2.1 Technical data

Power supply

*Operating voltage(supply by the bus)	21...30 V DC,
* Current consumption EIB / KNX(operate)	< 15 mA
* Current consumption EIB / KNX(standby)	< 5 mA
* Power consumption EIB / KNX(operate)	< 450 mW
* Power consumption EIB / KNX(standby)	< 150 mW

Output nominal values

* Type of Device M/R	4.16.1	8.16.1	12.16.1
* Number of contacts	4	8	12
* In rated current	16 A	16A	16A
* Power loss per device at max. load	2.7 W	5.4W	8 W
* Un rated voltage	250/440V AC (50/60 Hz)		

Output switching currents

* AC operation (cos□ = 0.8)	12A / 230 V
* Fluorescent lighting load	16 A / 250 V (150 µF)
* Minimum switching capability	0.1mA/1V
DC current switching capability (ohmic load)	16 A / 12 V DC
Output life expectancy	
* Mechanical Life	> 1000000
* Electrical Life (240 V/cos□ = 0.8)	> 100000

Output switching delay without additional DC power

* Max. delay time of relay per position changes (charge time of the capacity)

4.16.1	8.16.1	12.16.1
400ms	400ms	400ms

Note: it has voltage(capacity of relay driver) detect function in device ,it stop active and keep the state of relays in the memory of device when the voltage is going to down to stop level so this function can prevent the relay is not active success ,the relays can active again in according to the state of relays in memory when the voltage (capacity of relay driver) is going to up to active level , this function is very useful for without additional DC power application in system , and the delay time is approx 0.4s on switch state change when the charge of the capacity is not enough.

Output switching delay with additional DC power

* Max. delay time of relay per position changes (charge time of the capacity)

8.16.1	12.16.1

	100ms	100ms

Note: in some of application need ON/OFF the relay frequently and not allow too much delay time, in that case it can be connected a additional 24-30VDC power supply, the Max. current is requested 24mA when the relay is active ,the standby current is requested 4mA , the delay time is approx 100ms on switch state change when the charge of the capacity is not enough

Connections

* EIB / KNX	Bus Connection Terminal 0.8 mm Ø, single core
* Load circuits	Screw terminal with Slotted head 0.2...4 mm² multi- core 0.4...6 mm² single-core
* cable shoe	12 mm
* Tightening torque	Max. 0.8 Nm

Operating and display

* Red LED and EIB / KNX push button all in one	For assignment of the physical address
* Contact position indication	Relay lever

Temperature range

* Operation	– 5 °C ~ + 45 °C
* Storage	– 25 °C ~ + 55 °C
* Transport	– 25 °C ~ + 70 °C

Environment conditions

* humidity	max. 95 % Non-condensing

Appearance design

* Modular	DIN-Rail Modular installation		
* Type−M/R	4.16.1	8.16.1	12.16.1
* Dimensions (H x W x D)	90 x W x 64		
* Width W (unit mm)	72	144	216
* Mounting width (1P=18 mm)	4P	8P	12P
* Mounting depth (unit mm)	64	64	64
Weight (unit kg)	0.26	0.49	0.72

Installation	Use 35 mm mounting rail
Mounting position	Electric switch box
Material and Colour	Plastic, grey
Standard and Safety	Certificated
* LVD Standard	EN60669-2-1 , EN60669-1
*EMC Standard	EN50090-2-2

CE mark

* In accordance with the EMC guideline and low voltage guideline

Pollutant	Comply with RoHS

Note: All of loads, at 230 V AC

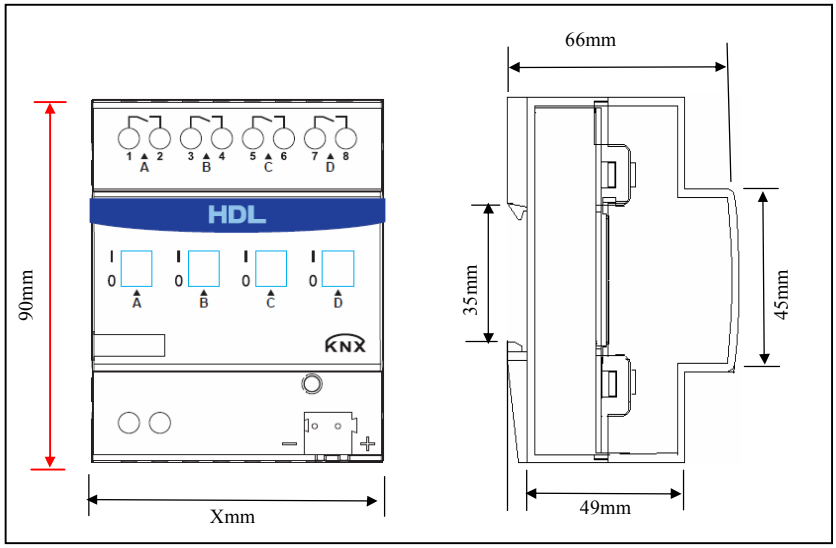
Motors	4HP
Lamps	
* Incandescent lamp load	3500W
Low-volt halogen lamps	
* Inductive transformer	1800 W
* Electronic transformer	2000 W
* Halogen lamp 230 V	3500 W
Mercury-vapour lamp	
* Uncompensated luminaire	2800 W
* Parallel compensated	2800 W
Fluorescent lamp T5 / T8	
* Uncompensated luminaire	3500 W
* Parallel compensated	2000 W
* DUO lamp	2000 W
Dulux lamp	
* Uncompensated luminaire	1500 W
* Parallel compensated	1500 W
Switching performance (contact)	
* Max. peak inrush-current Ip (120 µs)	600 A
* Max. peak inrush-current Ip (240 µs)	480 A
* Max. peak inrush-current Ip (480 µs)	300 A
* Max. peak inrush-current Ip (1000 µs)	170 A

Application table

Type	M/R4.16.1	M/R8.16.1	M/R12.16.1
Max. number of communication objects	90	170	250
Max. number of group addresses	254	254	254
Max. number of associations	254	254	254

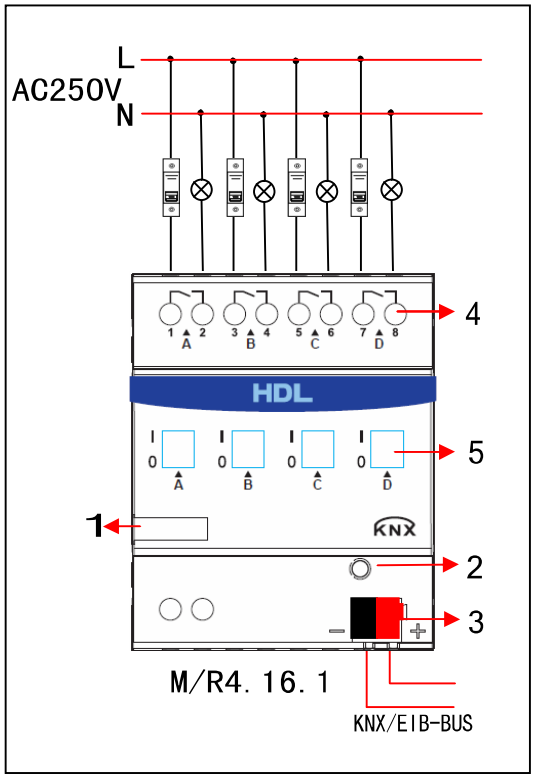
Note: The programming requires the EIB Software Tools ETS2 V1.3 or ETS3.0. If use ETS2 V1.3, then import "*.vd2". If use ETS3.0, then Import "*.vd3

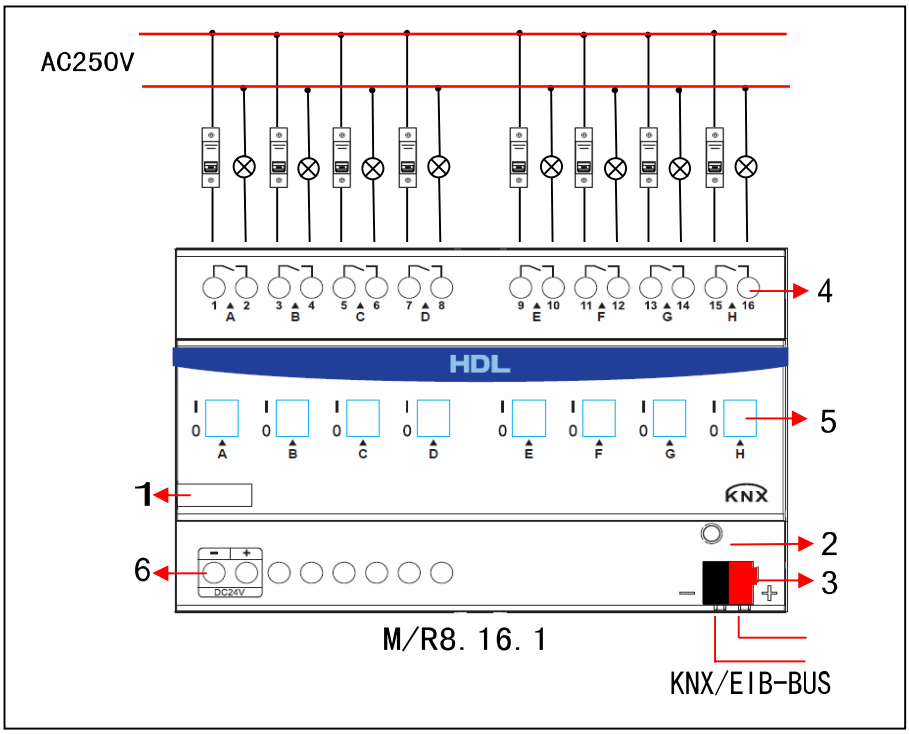
2.2 Dimension drawings

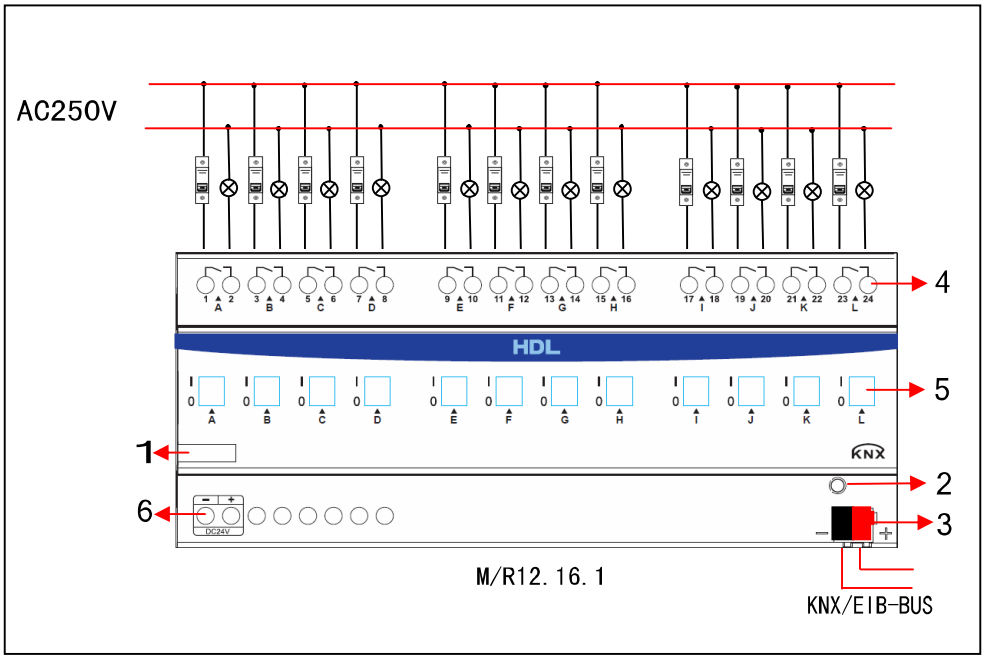


	M/R4.16.1	M/R8.16.1	M/R12.16.1
X	72mm	144mm	216mm

2.3 Wiring diagram







1 Label area
2 Programming button＆Programming LED
3 KNX/EIB Bus Connector
4 Terminal for Load Connection
5 Contact position indication and manual operation
6 Additional power DC24V (Max.24mA in operate , Min. 4mA in

standby) optional

Note: a) Dimensions of the space to be provided for each switch
b) Dimensions and position of the means for supporting and fixing the switch within this space
c) Minimum clearance between the various parts of the switch and the surrounding parts where fitted
d) Minimum dimensions of ventilating opening , if needed, and their correct arrangement.
e) The protective devices (e.g. fuses, automatic protective devices, etc.) to be connected to the load to avoid overloading

2.4 Maintenance and Cautions

*Please read this user manual carefully before any operation.
*Don't close to the interfering devices.
*The site should be ventilated with good cooling environment.
*Pay attention to damp proof, quakeproof and dustproof.
*Avoid rain, other liquids or caustic gas.
*Please contact professional maintenance staff or HDL service center for repair or fix.
*Remove the dust regularly and do not wipe the unit with the volatile liquids like alcohol, gasoline, etc.
*If damaged by damp or liquid, turn off it immediately.
*Regularly check the circuitry and other related circuit or cables and replace the disqualified circuitry on time.
*For security, each circuit to connect an MCB or fuse
*Installation location should be well-ventilated, pay attention to moisture, shock, dust proof.

3- Software

HDL KNX/EIB Switch Actuators database use ETS3.0 to do the design. The device types are M/R4.16.1, M/R8.16.1 and M/R12.16.1,and the databases name are “Switch 4fold 16A”,”Switch 8fold 16A”,”Switch 12fold 16A”. All Interface and the functions Apply parameters please overview the following description of the paragraph.

Each channel ouput of the Switch Actuators are independent and the same. So, Understand only one channel ouput is enough. The following paragraph will description of the first channel output in detail.

3.1 Database functions Overview

The following table provide an overview of the functions and some parameters with the switch actuators:

Switch function	M/R4.16.1	M/R8.16.1	M/R12.16.1
General	---	---	---
Cycle telegram (heartbeat)	**Y**	**Y**	**Y**
Switch delay after recover	**Y**	**Y**	**Y**
Switch Actuator	---	---	---
Statistics total ON time	**Y**	**Y**	**Y**
Voltage fail state	**Y**	**Y**	**Y**
Voltage Recovery state	**Y**	**Y**	**Y**
Time	---	---	---
Flashing	**Y**	**Y**	**Y**
Staircase lighting	**Y**	**Y**	**Y**
ON/OFF delay	**Y**	**Y**	**Y**
Scene	---	---	---
SceneNO.1-64	**Y**	**Y**	**Y**
Threshold	---	---	---
Threshold lower	**Y**	**Y**	**Y**
Threshold middle	**Y**	**Y**	**Y**
Threshold upper	**Y**	**Y**	**Y**
Curtain	---	---	---

Curtain top/left	Y	Y	Y
Curtain bottom/right	Y	Y	Y
Logic	---	---	---
AND	Y	Y	Y
OR	Y	Y	Y
XOR	Y	Y	Y
GATE	Y	Y	Y
Heating Actuator	---	---	---
Voltage fail state	Y	Y	Y
Recovery	Y	Y	Y
Switch state Response	Y	Y	Y
1bit/1byte PWM control	Y	Y	Y

Table1: Database application overview.

Note: For each function and mode, can only be used alone, but "ON/OFF delay" function can be used with “switch actuator” mode and scene function .

3.2 Object/Association/Group address define

In following table, The objects is assigned to the some function of the channel output pages, If active some functions and the object will be valid. One or more group addresses can be assigned to a object. The association will connect group addresses to the object.

Name	type	Max. number of communication objects	Max. number of associations	Max .number of group addresses
Switch 4fold 16A	**M/R4.16.1**	**90**	**254**	**254**
Switch 8fold 16A	**M/R8.16.1**	**170**	**254**	**254**
Switch 12fold 16A	**M/R12.16.1**	**250**	**254**	**254**

Table2: Overview the max. number of the objects, max. number of associations and max. number of the group addresses

Note: If you use ETS2V1.3, Please import “VD2”, But you use the ETS3.0, Please Import “VD3” to “VD5”.

3.3 Function parameter “General”

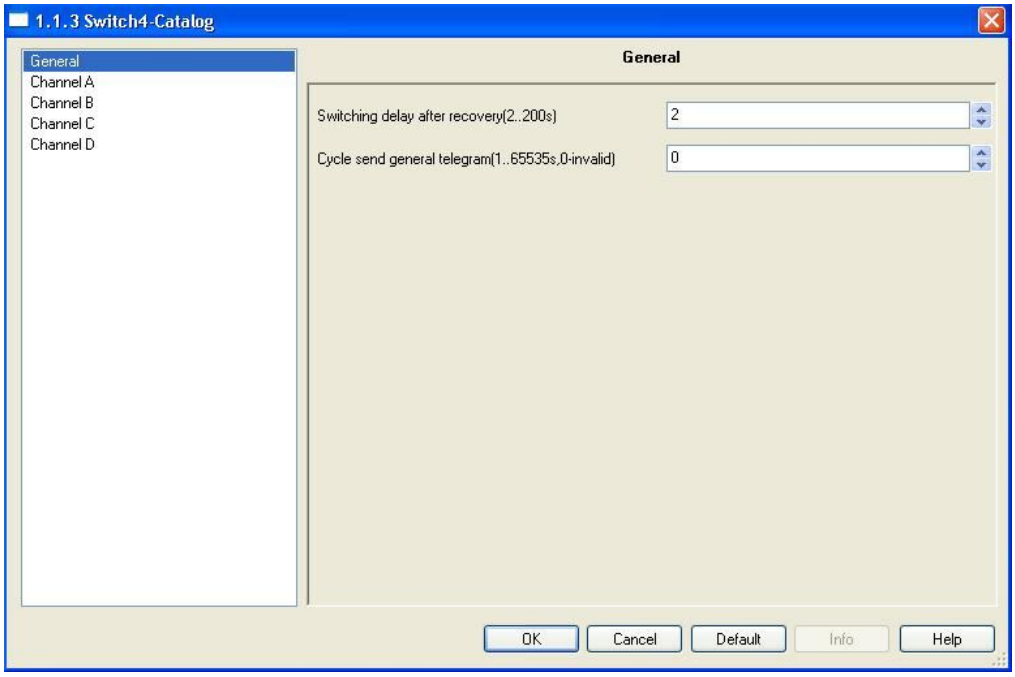


Fig1: “General” parameter windows

In the parameter of the general windows can set two parameters “Switching delay after recovery ” and “Cycle send general telegram”.

---Switching delay after recovery(2..200s)

Can operate relay for a delay time 2..200s after the power on. The default value is 2 seconds. The Min. value is 2 seconds, and the max. value is 200 seconds.

Options: **2…200s**

When the power on and timer start, and when the time out, The switch can be allow operating . This function is selected by user

---Cycle send general telegram(1..65535s,0-invalid)

The range of the parameter is 0 to 65535s. Zero of parameter disable the function , other of parameter enable this function

Options: **0…65535s**

The parameter set to nonzero, Device will send a telegram data cyclically when time out. Send the value alternately between 0 and 1.

3.4 Function parameter Channel “N”

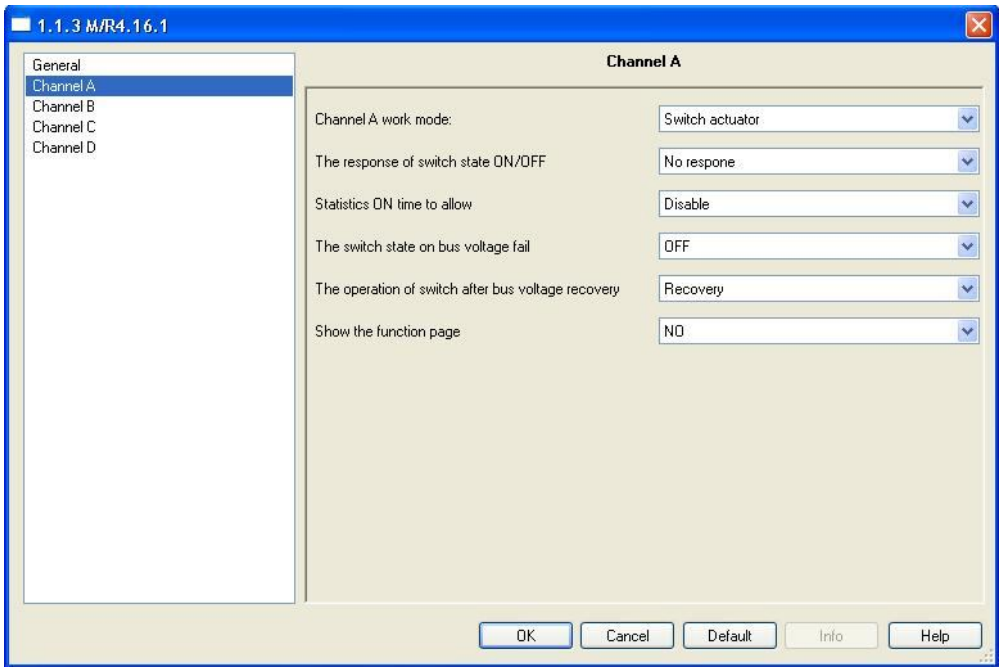


Fig2: “Channel N” parameter(N=A,B,C...) windows

In the parameter windows of the “Channel N”, can setup some common functions. Through functional selection and download the database to the device, and device will work in accordance with the selected function.

---Channel “N(N=A,B,C…)” work mode:

The function of the output “N” work mode can be selected with three parameter.

Options: **Switch Actuator**
Heating Actuator
Inactivated

If select **“Inactivated”**, The channel “N” function will be invalid, otherwise work in the other two modes.

3.5 Channel mode “Switch Actuator”

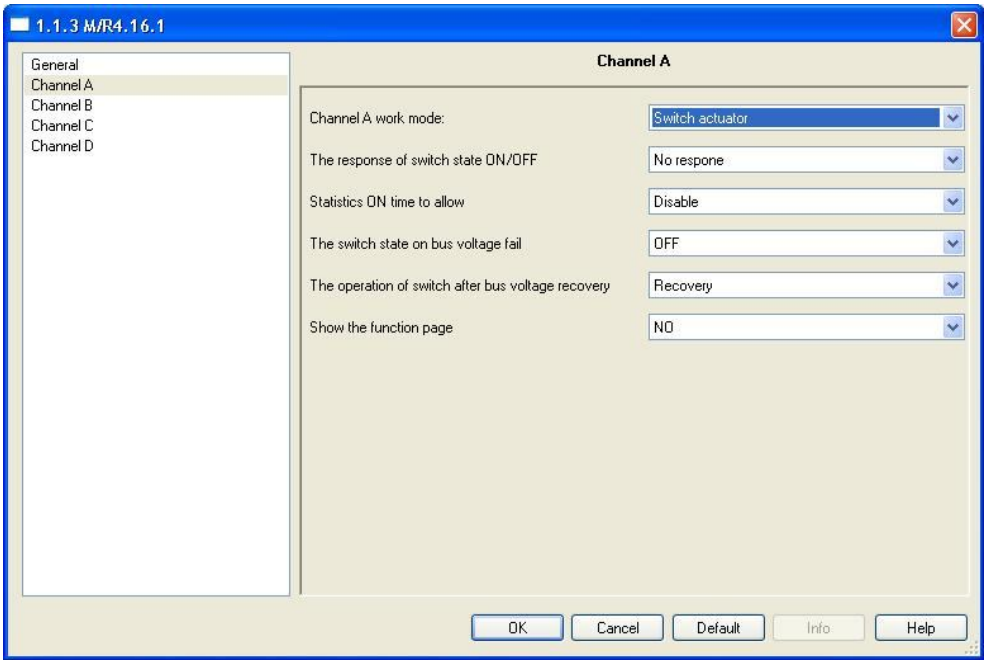


Fig3: Switch Actuator windows

More functions setup in this mode, the following section will description detailed of the Switch Actuator mode.

---The response of switch state ON/OFF

This parameter determine the work mode of response

Options: **No response**
Always response
Only after changed

No response: no response switch state.
Always response: always response switch state of the channel when receive the channel telegram data.
Only after changed: only response switch state of the channel when change state changed.

---Statistics ON time

Statistics per channel ON time , useful for management and monitoring

.

Options: **Disable**
Enable
Disable: Disable Statistics ON time
Enable: Enable Statistics ON time

---The switch state on bus voltage fail

When bus voltage failure and the function will be executed. Three selection will be available as following:

Options: **Unchange**
ON
OFF

Unchange:
The channel switch position unchanged after bus voltage failure
ON: The channel position will be switch ON after bus voltage failure
OFF: The channel position switch OFF after bus voltage failure

---The operation of switch after bus voltage recovery
When power on and the bus voltage recovery, This function will be executed. four selection will be available as following:

Options: **Unchange**
Recovery
ON
OFF
Unchange: The channel switch position unchanged after bus voltage recovery.
Recovery: After bus voltage recovery, The channel switch position will be back to the state of the power-down previous.
ON: The channel position will switch ON after bus voltage recovery.
OFF: The channel position will switch OFF after bus voltage recovery.

Show the function page
If this parameter is activated, and channel function page will be showed. The function page Include Time, Scene, Threshold, Curtain and Logic. Details see the following sections.

3.5.1 Channel function

The following will describe detail the functions parameter setup of the channel.

3.5.2 Channel function parameter

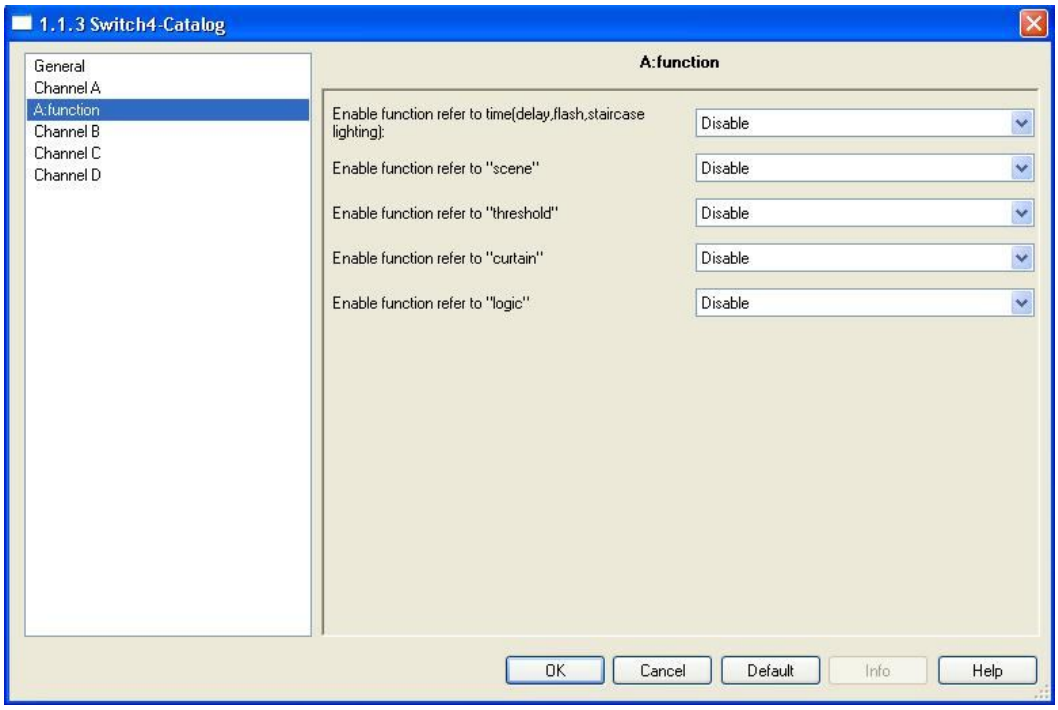


Fig4: Channel function windows

In normal case, The each channel function is disabled, If enabled and the channel function will be valid.

Note: For each function, can only be used alone, or "ON/OFF delay" can be used with “sense” function and “switch actuator” mode

---Enable function refer to time(delay, flash, staircase lighting):

If set to Enable, and the time function will be enable .

Options: **Disable**
Enable

Disable: disable time function.
Enable: enable time function.

---Enable function refer to "scene"

If set to Enable, and the scene function will be enable.

Options: **Disable**
Enable

Disable: disable scene function.
Enable: enable scene function.

---Enable function refer to "threshold"

If set to Enable, the Threshold function will be enable.

Options: **Disable**
Enable

Disable: disable Threshold function.
Enable: enable Threshold function.

---Enable function refer to "curtain"
If set to Enable, the Curtain function will be enable.

Options: **Disable**
Enable

Disable: Disable Curtain function.
Enable: Enable Curtain function.

---Enable function refer to "logic"
If set to Enable, the Logic function will be Enable.

Options:**Disable**
Enable

Disable: Disable Logic function.
Enable: Enable Logic function.

3.5.3 Channel function “time”

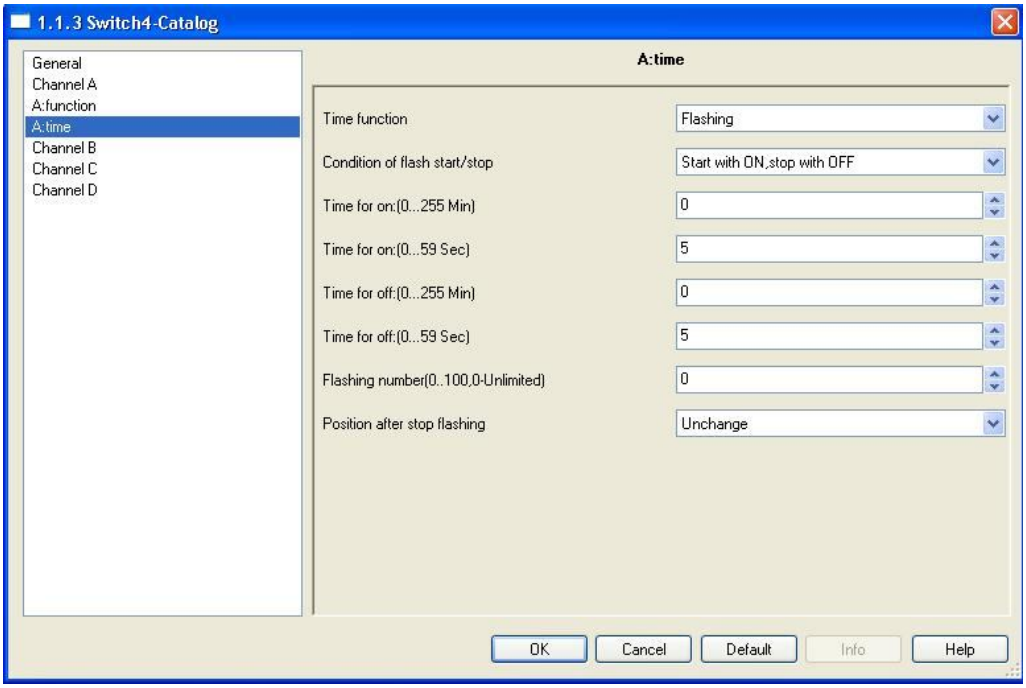


Fig5: Time function windows

The Time function include three work mode as following:

Options:**Flashing**

Staircase lighting

ON/OFF delay

3.5.3.1 Channel function “Time-Flashing”

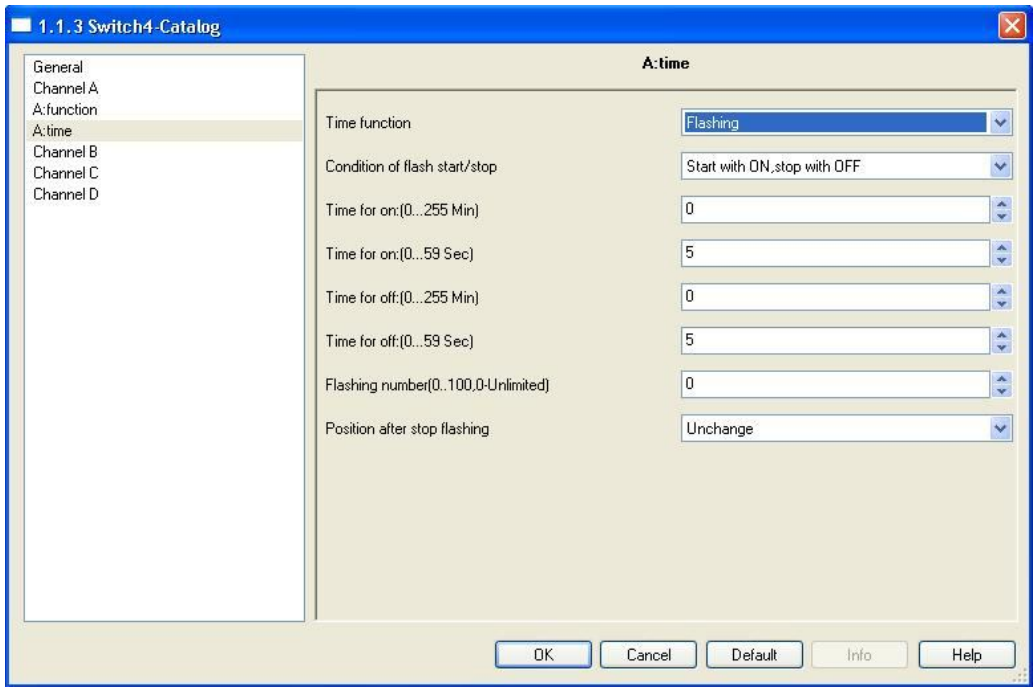


Fig6: Time-Flashing function windows
Switch will flashing between ON and OFF in this mode.

Condition of flash start/stop
Three Control mode for this function .

Options:**Start with ON, stop with OFF**
Start with OFF, stop with ON
Always flash, start with ON/OFF

Start with ON, stop with OFF: Start flashing with ON and stop flashing with OFF.
Start with OFF, stop with ON: Start flashing with OFF and stop flashing with ON.
Always flash, start with ON/OFF: Start flashing with ON or OFF.

---Time for on:(0...255 Min)
Duration minutes in the ON state.

---Time for on:(0...59 Sec)
Duration seconds in the ON state.

---Time for off:(0...255 Min)

Duration minutes in the OFF state.

---Time for off:(0...59 Sec)
Duration seconds in the OFF state
---Flashing number(0..100,0-Unlimited)
The number of flashing, range between 0 and 100. 0 is unlimited.
---Position after stop flashing
Switch position after stop flashing by overflow counter ,include three parameters.

Options: **Unchange**
ON
OFF

Unchange: The switch state position unchange after flashing couner overflow.
ON: The switch state position set to ON after flashing counter overflow.
OFF: The switch state position set to OFF after flashing counter overflow.

3.5.3.2 Channel function “time-Staircase lighting”

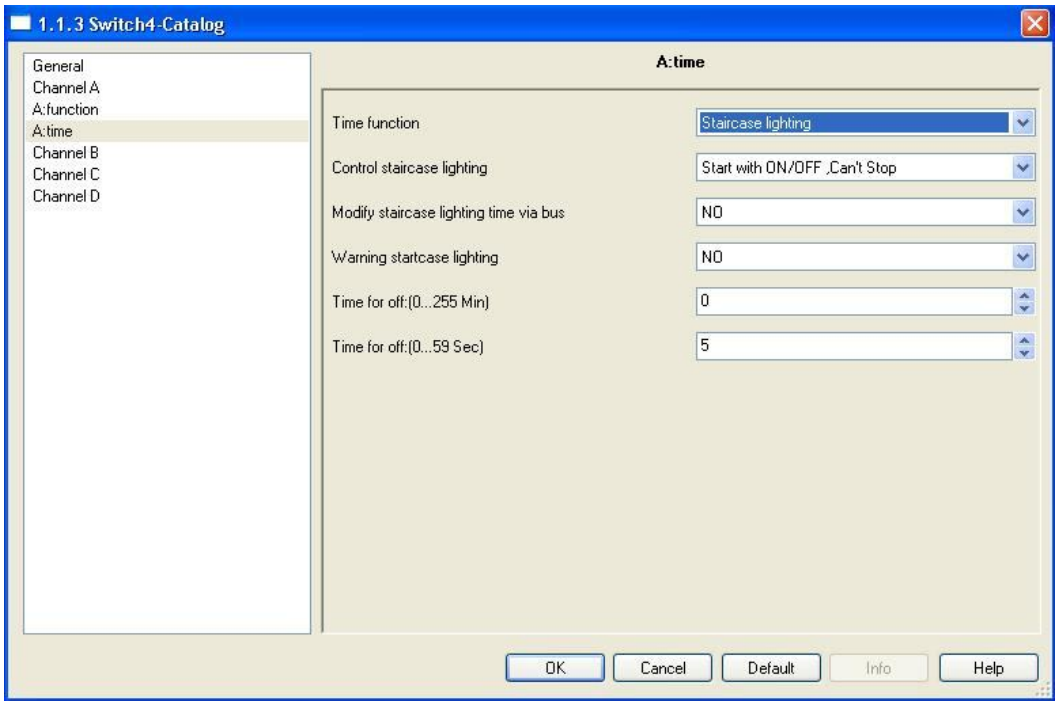


Fig7: Time-Staircase lighting function windows
For staircase application

Control staircase lighting
Control staircase light with three mode.

Options:**Start with ON, Stop with OFF**
Start with ON, Invalid with OFF
Start with ON/OFF , Can't Stop

Start with ON, Stop with OFF: The light ON and timer run automatic with switch ON ,stop with time out. Stop with switch OFF also .
Start with ON, Invalid with OFF: The light ON and timer run automatic with switch ON ,stop with time out. Can't Stop with switch OFF.
Start with ON/OFF ,Can't Stop: The light ON and timer run automatic with switch ON or OFF, Can't stop with switch ON or OFF.

---Modify staircase lighting time via bus

Options: **NO**
YES

NO: Can't modify staircase lighting delay off time via bus , only can be set by database.
YES:allow modify staircase lighting delay off time via bus by user.

---Warning staircase lighting

Options: **NO**
YES

NO: Prohibition Alarm.
YES: Allow send out warning state use warning data point for ON/OFF staircase light.

---Time for off:(0...255 Min)
Duration minutes of the staircase lighting delay off time.

---Time for off:(0...59 Sec)
Duration seconds of the staircase lighting delay off time.

3.5.3.3 Channel function “time-ON/OFF delay”

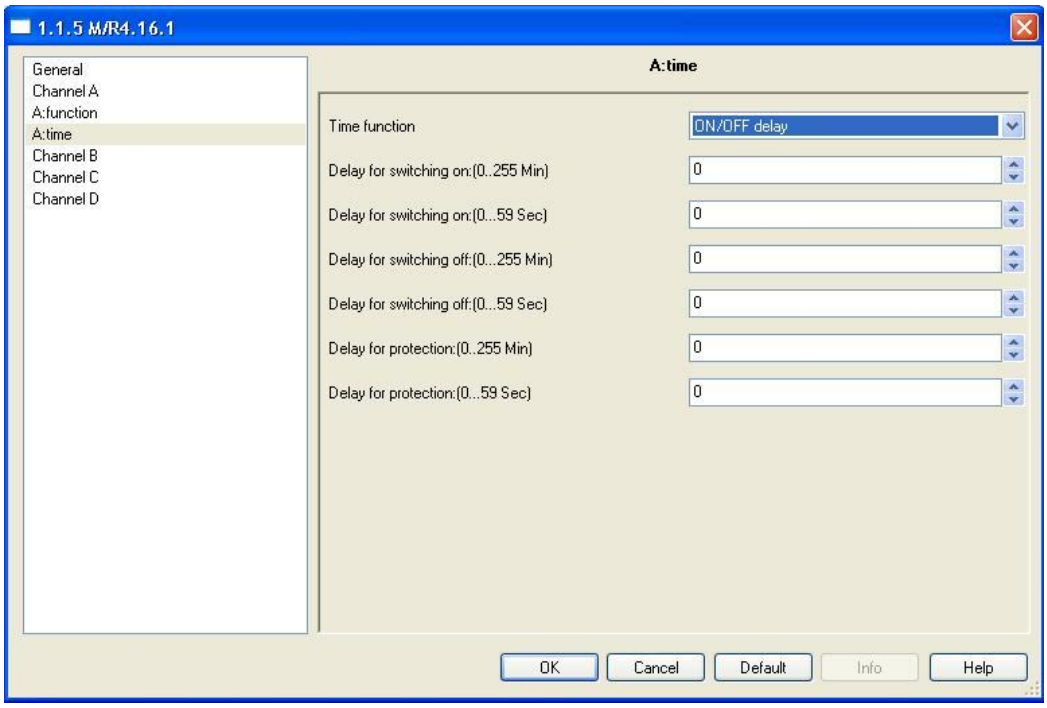


Fig8: Time-ON/OFF delay function windows

This function is including switch ON delay, switch OFF delay and protect delay. Some special equipment need time to restart so can use protection delay to do this .

---Delay for switching on:(0..255 Min)

Duration minutes of the ON delay

---Delay for switching on:(0...59 Sec)

Duration seconds of the ON delay.

---Delay for switching off:(0...255 Min)

Duration minutes of the OFF delay.

---Delay for switching off:(0...59 Sec)

Duration seconds of the OFF delay.

---Delay for protection:(0..255 Min)

Duration minutes of the protected delay.

---Delay for protection:(0...59 Sec)

Duration seconds of the protected delay.

Note: When switch is OFF , The protection delay time start, not allowed to operate switch to ON until the timeout.

3.5.4 Channel function “scene”

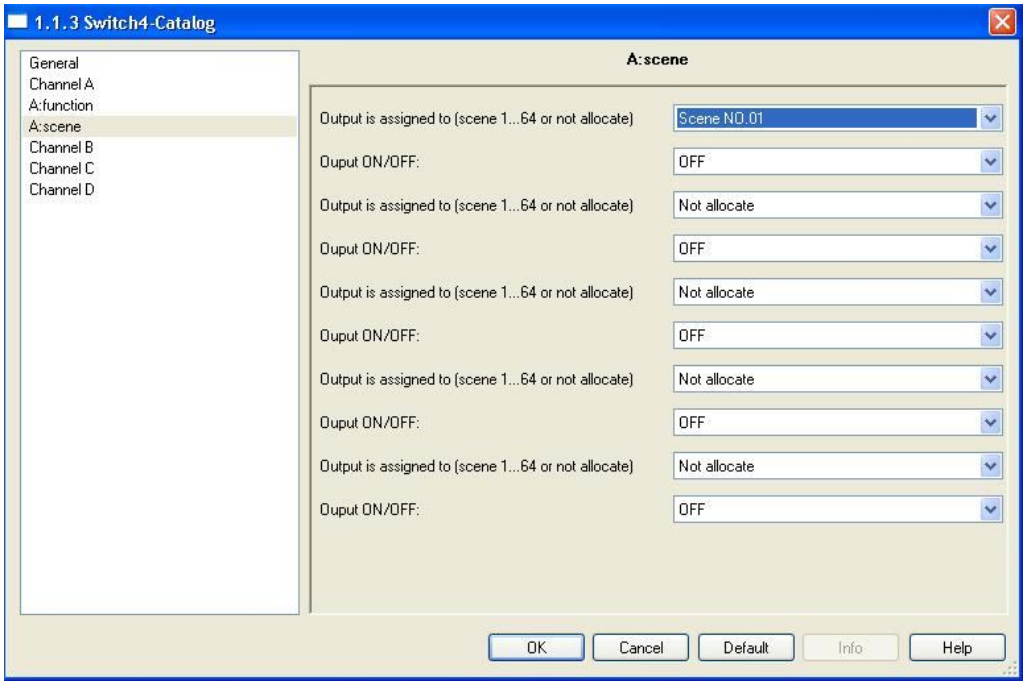


Fig9: Scene function windows

In each channel it has 5 scenes can be stored . Each scene can be set to ON or OFF.

The scene is called by receive a value of telegram from the bus which the value of the telegram(bit 0-6) equal a scene number, The bit seven of value of the telegram must 0 .

The scene is stored by receive a value of telegram from the bus which the value of the telegram(bit 0-6) equal a scene number, The scene state is the current switch state. The bit seven of value of the telegram must 1

---Output is assigned to (scene 1...64 or not allocate)

Options: **not allocate**
Scene NO.01
Scene NO.02
……
Scene NO.64

The scene number is between 1 and 64, the value is between

0 and 63 or not allocate.

---Output ON/OFF:
Channel switch ON or OFF

Options: **ON**
OFF

ON: Channel switch to ON.
OFF: Channel switch to OFF.

3.5.5 Channel function “threshold”

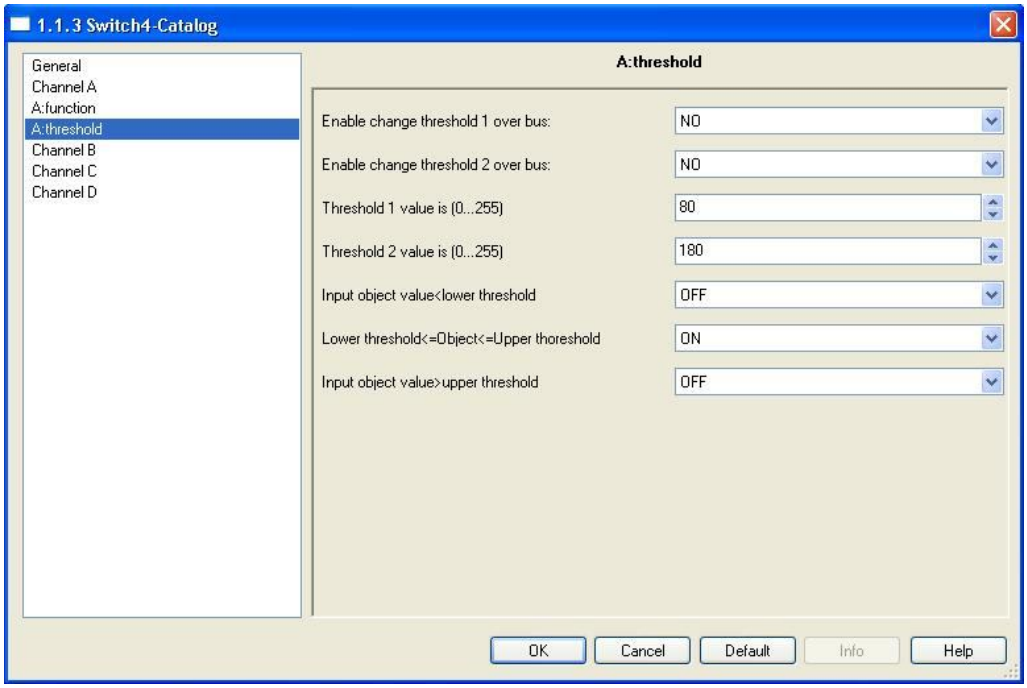


Fig10: Threshold function windows

The threshold include two threshold value are the threshold1 and threshold2.The threshold1 and threshold2 can be set between 0 and 255. The switch state changed according to the value of receiving from bus , it has three ways to compare with the value of threshold.

---Enable change threshold 1 over bus:

Options: **YES**
NO

NO: Do not allow change threshold1 via bus.
YES: Allow change threshold1 via bus.

---Enable change threshold 2 over bus:

Options: **YES**
NO

NO: Do not allow change threshold2 via bus.
YES: Allow change threshold2 via bus.

---Threshold 1 value is (0...255)
Set threshold 1 value between 0 and 255. Default is 80

Options:**0..255**

---Threshold 2 value is (0...255)

Set threshold 2 value between 0 and 255.Default is 180

Options:**0..255**

---Input object value<lower threshold

If the value of receiving telegram from bus lower than the minimum threshold value, the switch will action according to below option (ON or OFF or no action)

Options: **Unchange**
ON
OFF

Unchange: The channel switch position no changed.
ON: The channel switch position set to ON.
OFF: The channel switch position set to OFF

.

---Lower threshold<=Object<=Upper threshold

If the value of receiving telegram from bus between Lower threshold and Upper threshold, the switch will action according to below option (ON or OFF or no action)

Options: **Unchange**
ON
OFF

Unchange: The channel switch position no changed.
ON: The channel switch position set to ON.
OFF: The channel switch position set to OFF

---Input object value>upper threshold

If the value of receiving telegram from bus more than the upper threshold value, the switch will action according to below option (ON or OFF or no action)

Options: **Unchange**
ON
OFF

Unchange: The channel switch position no changed.
ON: The channel switch position set to ON.
OFF: The channel switch position set to OFF

3.5.6 Channel function “curtain”

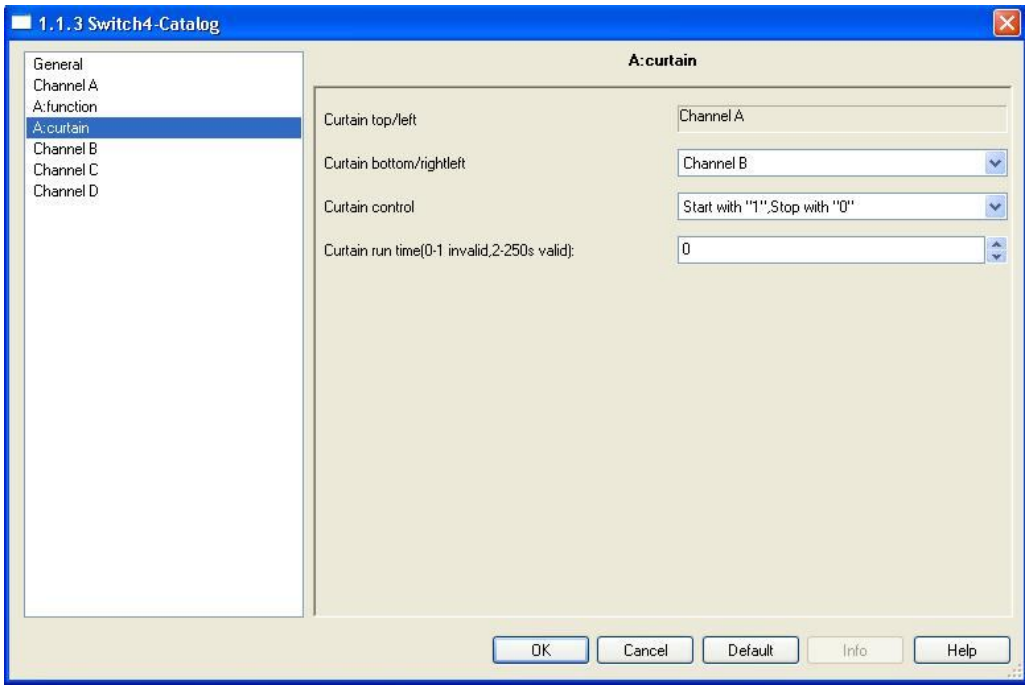


Fig11: Curtain function windows

The curtain function need combination two channels work together. the first channel control top/left of curtain and the second channel control bottom/right of curtain. It runs by value of receiving telegram from the bus and it will be stop by the timeout or by value of receiving telegram.

---Curtain top/left

The first channel for “top/left” is currently the operate channel.

Options: **channel “N”(N=current channel)**
This channel output control curtain top/left.

---Curtain bottom/right

It can be select another channel as second channel for “bottom/right”
Options: **channel “M”(M= another channels)**

e.g. If first channel is “channel A” and the maximum channel number

of device is 4, only can select channel B or channel C or channel D for second channel

Curtain control

Select which value used for curtain start running or stop running.

Options: **Start with "1",Stop with "0"**
Start with "1",Invalid with "0"
Start with"1"/"0",Can't stop

Start with "1",Stop with "0": The curtain start running by value “1” of receiving telegram , The curtain stop running by value “0” of receiving telegram

Start with "1",Invalid with "0": The curtain start running by value “1” of receiving telegram , The curtain continue running until the timeout

Start with"1"/"0",Can't stop: The curtain start running by value “1” or “0” of receiving telegram , The curtain continue running until the timeout

---Curtain run time(0-1 invalid,2-250s valid):

The curtain continue running unless receive a stop value when the parameter is set to “0” and “1”. The curtain stop running by timeout by user set between 2 and 255 second

Options:**0..250s**

3.5.7 Channel function “logic”

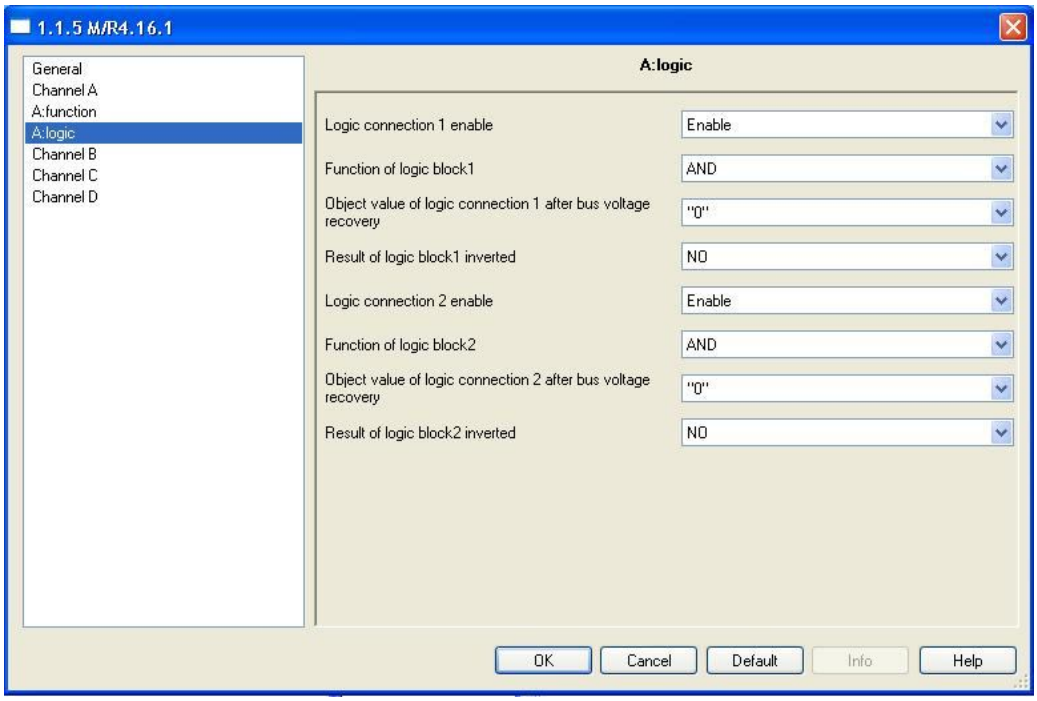
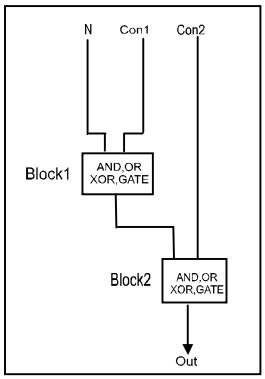


Fig12: Logic function windows



The logic functions block show at right side graphic , it include two logic block in side , logic block 1 has two input which are “N” and connect 1 (“Con1”), the output of logic block 1 is connected to input of logic block 2 . logic block 2 has two input which are connect2(“Con2”) and output of logic block1 , the output of logic block2 is “Out” “Logic connection 1” and “Logic connect ion 2”. Both of logic block 1 and 2 allow select “AND”, “OR”, “XOR”, “GATE” logic by user

--- **logic connection1 enable**

Enable this parameter, the logic connecton1 in active state. The logic block 1 will no function by disable connect1(“Con1”) , means the “N” connect to logic block 2 directly

Options: **Disable**
Enable

Disable: disable logic connection1
Enable: enable logic connection1

--- **Function of logic block1**

This logic block allow select as “AND” or “OR” or “XOR” or “GATE”

for Boolean calculation by user

Options: **AND**
OR
XOR
GATE

AND: Boolean calculation according to “AND” rule
OR: Boolean calculation according to “OR” rule
XOR: Boolean calculation according to “XOR” rule
GATE: “N” pass through logic block1 to logic block 2 by the value of “Con1” set to 1 .
“N” cannot pass through logic block1 to logic block 2 until the value of “Con1” is setting to 1 , the output of logic block1 keep the state as before

---Object value of logic connection 1 after bus voltage recovery
The value of the parameter of logic connection1 initial by bus voltage recovery .

Options: **0**
1

0: Initialization logic connecttion1 value to 0.
1: Initialization logic connection1 value to 1.

---Result of logic block 1 inverted
setting this parameter to YES, the output of connection 1 will be inverted.

Options: **NO**
YES

NO: Result of block not inverted.
YES: Result of block inverted.

--- **logic connection2 enable**
Enable this parameter, the logic connecton2 in active state. The logic block 2 will no function by disable connect2 (“Con2”) , means the output of logic block 1 pass through “Out” directly

Options: **Disable**
Enable

Disable: disable logic connection2
Enable: enable logic connection2

--- **Function of logic block2**
This logic block allow select as “AND” or “OR” or “XOR” or “GATE” for Boolean calculation by user

Options: **AND**
OR
XOR
GATE
AND: Boolean calculation according to “AND” rule
OR: Boolean calculation according to “OR” rule
XOR: Boolean calculation according to “XOR” rule
GATE: “Out” Keep state as before when value of “Con2” set to 0 . Output of logic block1 pass through to “Out” of logic block when value of “Con2” set to 1 .

---Object value of logic connection 2 after bus voltage recovery
The value of the parameter of logic connection2 initial by bus voltage recovery .

Options: **0**
1

0: Initialization logic connecttion2 value to 0.
1: Initialization logic connection2 value to 1.

---Result of logic block 2 inverted
setting this parameter to YES, the output of connection2 will be inverted.

Options: **NO**
YES

NO: Result of block not inverted.
YES: Result of block inverted.

3.5.8 Channel "Heating Actuator"

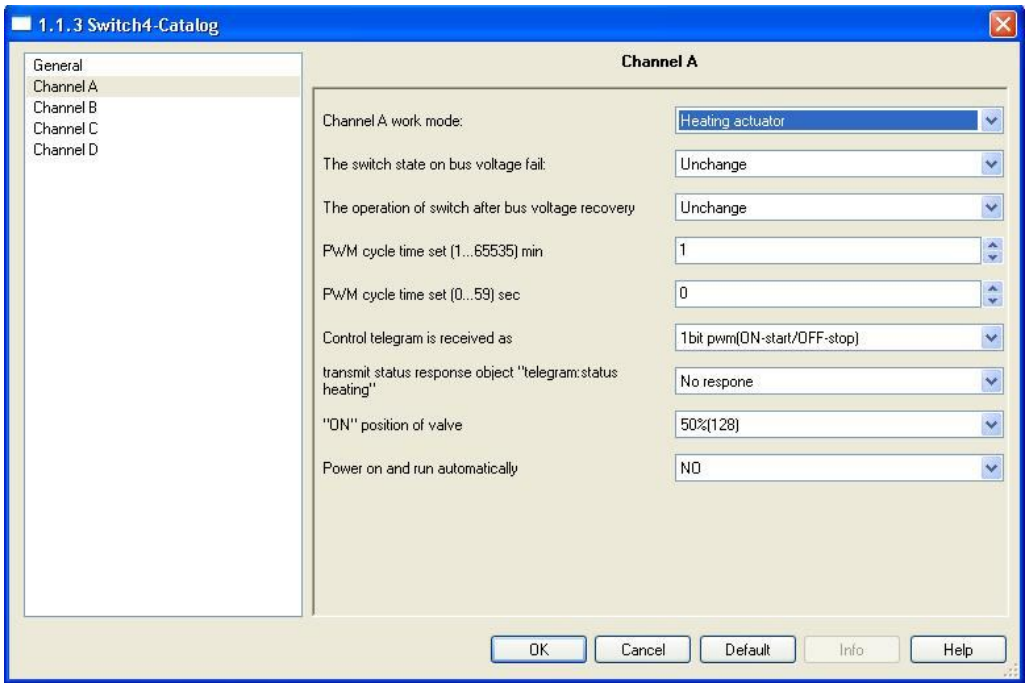


Fig13: Heating Actuator windows

The channel will work at PWM mode. The PWM control by 1bit or 1byte.

---The switch state on bus voltage failure:

It has three option can be set by user

Options: **Unchange**
ON
OFF

Unchange: The channel switch position unchanged after bus voltage failure
ON: The channel position will switch ON after bus voltage failure
OFF: The channel position will switch OFF after bus voltage failure

---The operation of switch after bus voltage recovery

It has four option for bus voltage recovery also as below

Options: **Unchange**
Recovery
ON

OFF

Unchange: The channel switch position unchanged after bus voltage recovery.
Recovery: After bus voltage recovery, the channel switch position will come back to the state of the power-down previous.
ON: The channel switch position will be set to ON after bus voltage recovery.
OFF: The channel switch position will be set to OFF after bus voltage recovery.

---**PWM cycle time set (1...65535) min**
Options:**1…65535m**
This cycle time is set Minimum is 1 minutes

---PWM cycle time set (0...59) sec
Options:**0..59s**
This cycle time is set in seconds

---Control telegram is received as
Type of control can be control as 1bit or 1byte.

Options: **1bit PWM(1-start/0-stop)**
1byte(255-switch ON/0-switch OFF/ other valve)

1bit PWM(1-start/0-stop): The PWM start and switch ON by the value of receiving telegram “1” , and stop by “0”.

1byte(255-ON/0-OFF/other valve): the switch ON always by the value of receiving telegram “255”, the switch OFF by the value of receiving telegram “0”. The PWM runs and pulse width of PWM is set according to the value of receiving telegram (1 to 254)

---transmit status response object "telegram: status heating"
It has three option for the channel state response setting

Options: **No response**
Always response
Only after changed

No response: no response switch state.
Always response: always response switch state of the channel when receive the channel telegram data.
Only after changed: only response switch state of the channel when

change state changed.

---"ON" position of valve

This parameter will set the valve of the PWM (pulse width).

Options**: 0%(OFF)**
10%(26)
20%(51)
30%(77)
40%(102)
50%(128)
60%(153)
70%(179)
80%(204)
90%(230)
100%(ON)

---Power on and run automatically

The PWM runs automatic by the setting YES, The PWM runs by manual when set to NO.

Options: **NO**
YES

YES**:** PWM running automatic at power on.
NO**:** PWM running by manual.

4-Communication objects description

In this section will introduce the communication objects, The objects will show by setting the function enable .

Note: In following sections the **N=A,B,C…**

4.1 Objects "General" and "Output N"

Number	Name	Object Function	Descript…	Group Addresses	Length	C	R	W	T	U
0	General	Send cycles			1 bit	C	R	-	T	-
10	Ouput A	Channel output			1 bit	C	-	W	-	U
30	Ouput B	Channel output			1 bit	C	-	W	-	U
50	Ouput C	Channel output			1 bit	C	-	W	-	U
70	Ouput D	Channel output			1 bit	C	-	W	-	U

NO.	Object name	Function	Flags	Data type
0	General	Send cycles	C R T	EIS1 DPT 1.003 1bit
This communication object is always active and valid. invert the value send telegram to bus in next frame. e.g. last telegram value is "1", the next telegram value is "0"				

Table 3.General object

NO.	Object name	Function	Flags	Data type
10,30…	Output N	Channel output	C W U	EIS1 DPT 1.001 1bit
These communication objects of the channel output used for ON/OFF an channel output, the switch output ON when the object receive the value is "1". the switch output OFF when the object receive the value is "0"				

Table 4 Output objects

4.2 All objects with channel "N"

Number	Name	Object Function	Descript…	Group Addresses	Length	C	R	W	T	U
0	General	Send cycles			1 bit	C	R	-	T	-
10	Ouput A	Channel output		1/0/1	1 bit	C	-	W	-	U
11	Ouput A	Aways respone switch state			1 bit	C	R	-	T	-
12	Ouput A	Read/write total ON time			2 Byte	C	R	W	T	U
13	Ouput A	Change staircase lighting time			2 Byte	C	-	W	-	U
14	Ouput A	Warning staircase lighting			1 bit	C	R	-	T	-
15	Ouput A	Scene(8bit)			1 Byte	C	-	W	-	U
16	Ouput A	Threshold input			1 Byte	C	-	W	-	U
17	Ouput A	Change threshold 1			1 Byte	C	-	W	-	U
18	Ouput A	Change threshold 2			1 Byte	C	-	W	-	U
19	Ouput A	Curtain top/left			1 bit	C	-	W	-	U
20	Ouput A	Curtain bottom/right			1 bit	C	-	W	-	U
21	Ouput A	Logic connection 1			1 bit	C	-	W	-	U
22	Ouput A	Logic connection 2			1 bit	C	-	W	-	U

4.2.1 Objects“Respone”

NO.	Object name	Function	Flags	Data type
11	Output N	No response /Always response /Only after changed	C R T	EIS1 DPT 1.001 1bit
This communication object used response the channel N state, channel state is ON the response state is “1”, Otherwise the state is “0”				

Table 5 Response

4.2.2 Objects “Read/write statistics total ON time”

NO.	Object name	Function	Flags	Data type
12	Output N	Read/write statistics total ON time	C R W T U	EIS10 DPT 7.007 2byte
This communication object is used for statistics the total ON time of the channel “N”. it can be read /write via bus by setting this function activity				

Table 6 Read/write statistics ON time (2byte)

4.2.3 Objects“Change staircase lighting time”

NO.	Object name	Function	Flags	Data type
13	Output N	Change staircase lighting time	C W U	EIS10 DPT 7.005 2byte
This communication object is used to modify the staircase lighting running time. allow modify staircase lighting time via bus by setting this function activity.				

Table 7 Modify staircase light running time(2byte)

4.2.4 Objects “Warning staircase lighting”

NO.	Object name	Function	Flags	Data type
14	Output N	Warning staircase lighting	C R T	EIS1 DPT 1.005 1bit
This communication object is used to warning the staircase lighting information. If the function is activity, the staircase lighting start or stop ,the communication object will warning via bus. channel “N” is ON warning “1”, Otherwise warning “0’.				

Table 8 Warning staircase light

4.2.5 Objects “Scene”

NO.	Object name	Function	Flags	Data type
15	Output N	Scene(8bit)	C W U	EIS14 DPT 18.001 1byte

This communication object is used to control the scene. The scene control see following explain:

Telegram value:

C	R	N	N	N	N	N	N

C: 0-Call scene
1-Store scene(If scene allocated and the scene is the current switch state)

R: Reserved

N: Scene NO.(bin:000000…111111=NO.1…64)

e.g: **Hexadecimal**

00h------call scene 1 (If scene allocated)
01h------call scene 2 (If scene allocated)
3Fh------call scene 64 (If scene allocated)

80h------store scene 1 (If scene allocated)
81h------store scene 2 (If scene allocated)
BFh------store scene 64 (If scene allocated)

Table 9 Scene(8bit)

4.2.6 Objects “Threshold”

NO.	Object name	Function	Flags	Data type
16	Output N	Threshold input	C W U	EIS14 DPT 5.004 1byte
If this communication object is activity , the input value of receiving telegram from bus compare with threshold 1 and threshold 2 calculate the state of switch according to the setting of database.				
17	Output N	Change threshold 1	C W U	EIS14 DPT 5.004 1byte
Change threshold1 value via bus.				
18	Output N	Change threshold 2	C W U	EIS14 DPT 5.004 1byte
Change threshold2 value via bus.				

Table 10 Threshold

4.2.7 Objects “Curtain”

NO.	Object name	Function	Flags	Data type
19	Output N	Curtain top/left	C W U	EIS1 DPT 1.010 1bit
This communication object control curtain top/left. The curtain top/left run or stop by the value of receiving telegram from the bus or stop until timeout .				
20	Output N	Curtain bottom/right	C W U	EIS1 DPT 1.010 1bit
This communication object control curtain bottom/right. The curtain bottom/right run or stop by the value of receiving telegram from the bus or stop until timeout				

Table 11 Curtain

4.2.8 Objects “Logic”

NO.	Object name	Function	Flags	Data type
21	Output N	Logic connection 1	C W U	EIS1 DPT 1.002 1bit
If this function has been activity , this communication object will show and the logic function is valid. The logic function include : AND,OR,XOR,GATE.				
22	Output N	Logic connection 2	C W U	EIS1 DPT 1.002 1bit
If this function has been activity, this communication object will show and the logic function is valid. The logic function include : AND,OR,XOR,GATE.				

Table 12 Logic

4.2.9 Objects “Heating”

Number	Name	Object Function	Descript...	Group Addresses	Length	C	R	W	T	U
0	General	Send cycles			1 bit	C	R	-	T	-
10	Ouput A	Heat with bit control			1 bit	C	-	W	-	U

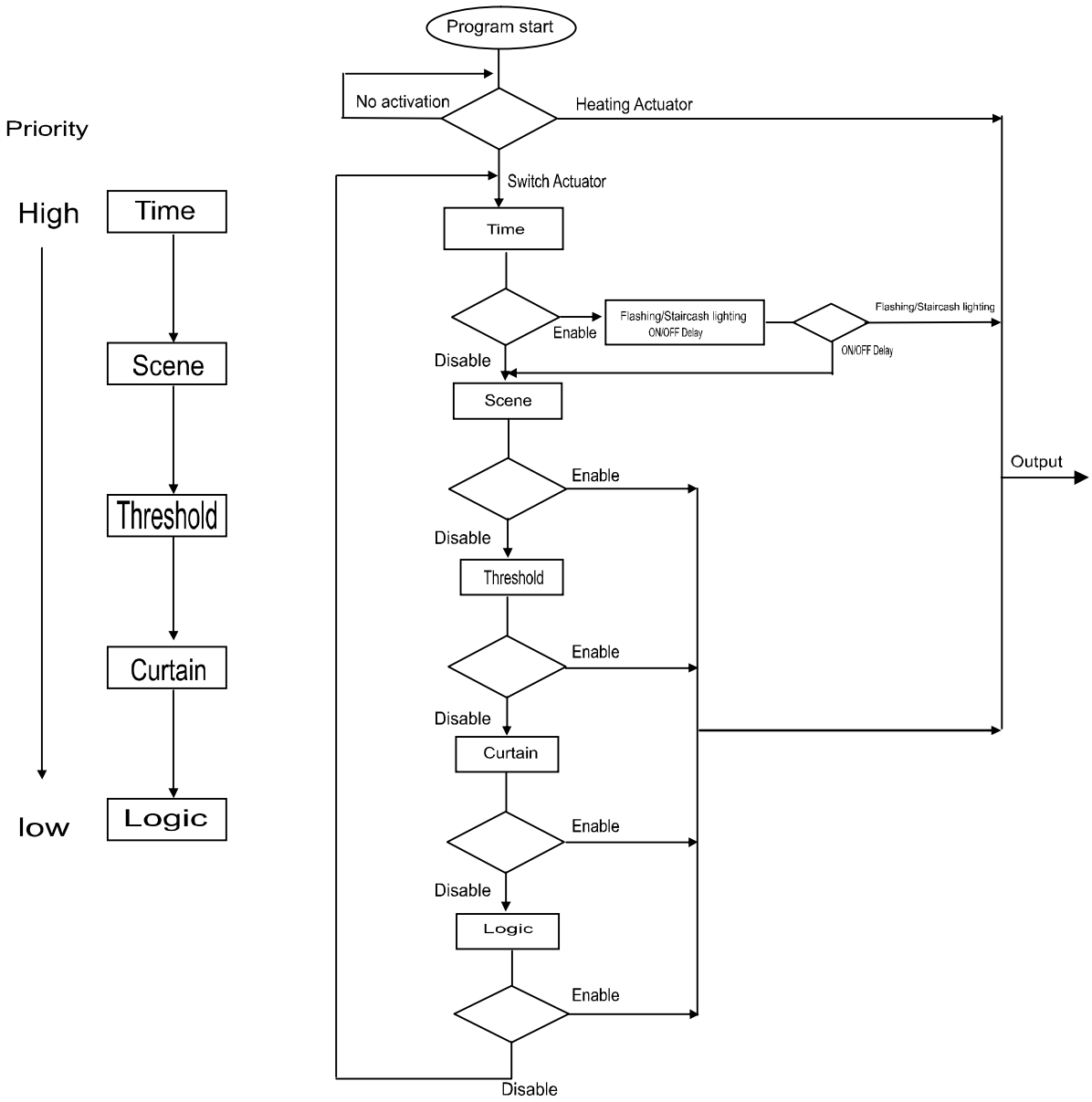
Number	Name	Object Function	Descript...	Group Addresses	Length	C	R	W	T	U
0	General	Send cycles			1 bit	C	R	-	T	-
10	Ouput A	Heat with byte control			1 Byte	C	-	W	-	U

NO.	Object name	Function	Flags	Data type
10	Output N	Heat with bit control	C W U	EIS1 DPT 1.001 1bit
If work in heating actuator, this communication object default show and valid. Start PWM by receive telegram “1”,stop PWM by receive telegram “0” , start running automatic when power on set by ETS				
10	Output N	Heat with byte control	C W U	EIS14 DPT 5.004 1byte
If select “heat with byte control”, this communication object has been showed and valid. Can modify value of PWM by receive 1byte data. output ON always if receive value is 255 , output OFF if receive value is 0, otherwise output PWM according to the value of receiving telegram from bus.				

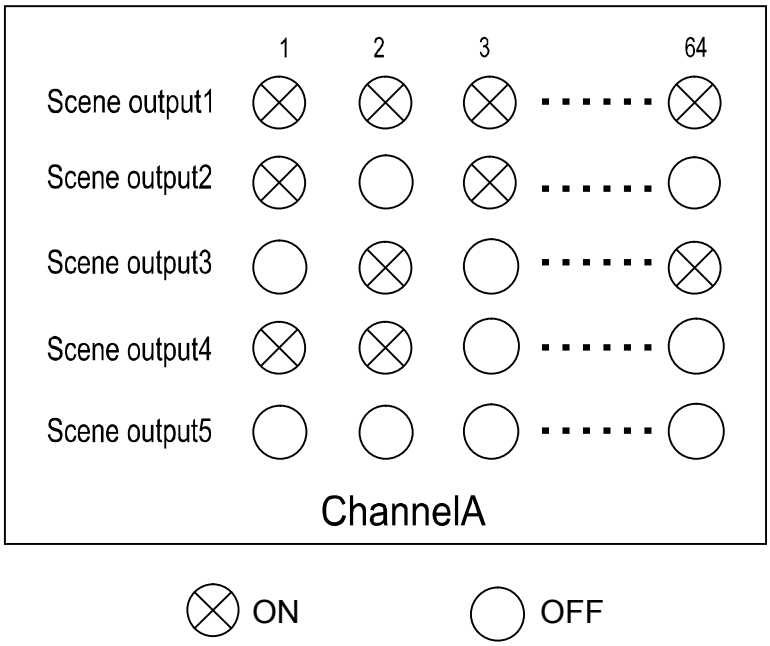
Table 13 Heating actuator

5-Application

5.1 Program functions diagram



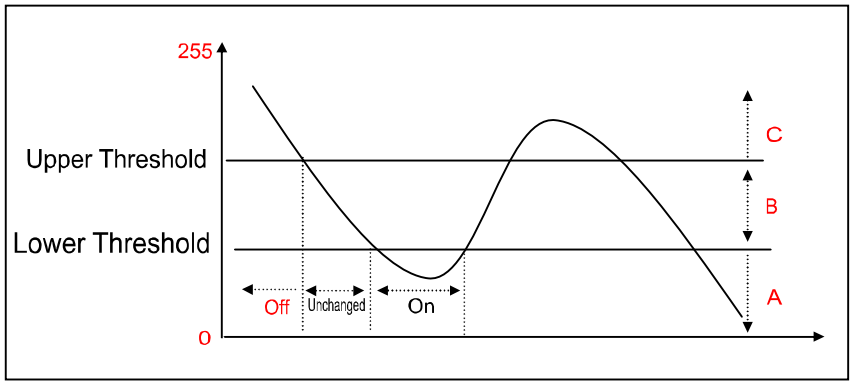
5.2 Scene



Per channel can be stored 5 scenes in the device , the number of scenes can select between 1 to 64 .
Channel B,C…'is same as channel A.

5.3 Threshold

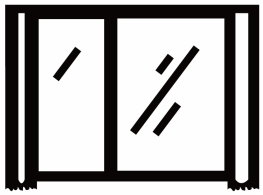
The threshold include two threshold value are the upper threshold and lower threshold. They are can be set between 0 and 255.



The upper threshold , lower threshold values and the state of ON and OFF can be set by using ETS software.
For example: ETS set A=ON, B=Unchanged, C=OFF.

5.4 Curtain

The curtain function need two channels output, the first channel control curtain top/left and the second channel control curtain bottom/right.



Top/Left **Channel A** Bottom/Right **Channel B**

In the above combination. If start running the curtain top/left, then channel A switch ON and the channel B switch OFF.
If start running the curtain bottom/right the channel B switch ON and the channel A switch OFF.
If running time out, the channel A and the Channel B will switch OFF .

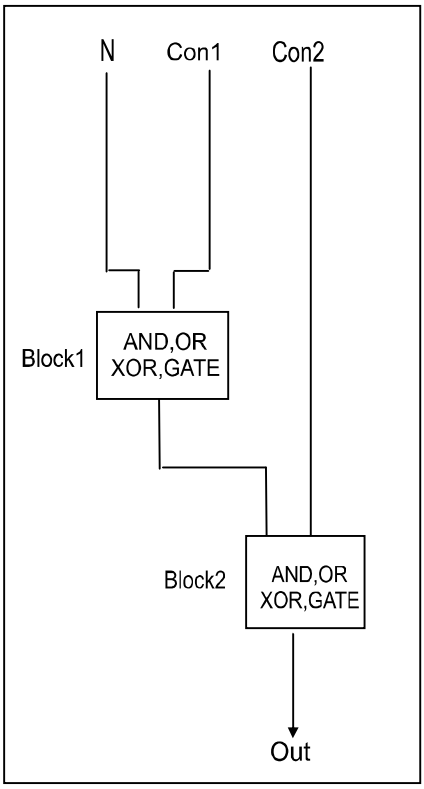
Start Run Top/Left : B→OFF
A→ON
Run Bottom/Right : A→OFF
B→ON

Stop Run : A→OFF
B→OFF

Other combinations are similar to the here.

5.5 Logic function

Logic function include two logic blocks in side. Both of logic block 1 and 2 allow select “AND”, “OR”, “XOR”, “GATE” logic by user



Note: N=channel A.B.C…
Con1=Logic connection1
Con2=Logic connection2

AND

N	L	R
0	0	0
0	1	0
1	0	0
1	1	1

GATE

N	L	R	
0	1	0	
1	1	1	
1	0	1	Lock
0	0	1	
0	1	0	Unlock
0	0	0	
1	0	0	Lock
1	1	1	Unlock

OR

N	L	R
0	0	0
0	1	1
1	0	1
1	1	1

XOR

N	L	R
0	0	0
0	1	1
1	0	1
1	1	0

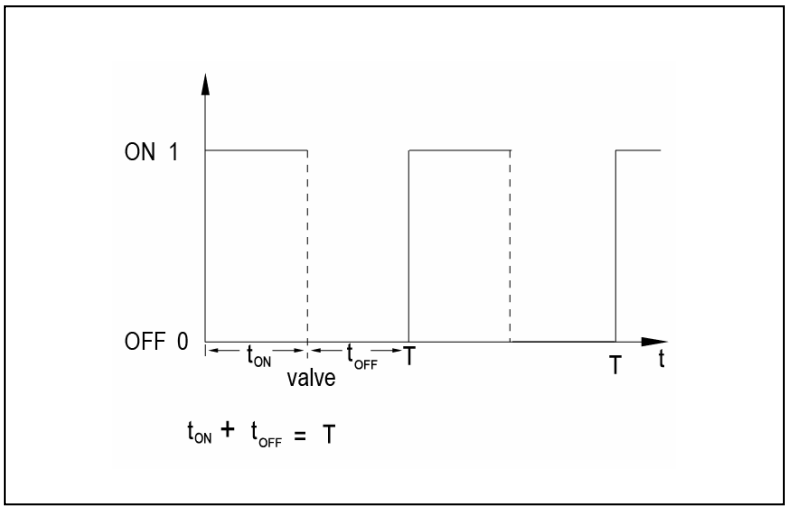
Note: N=channel A, B. C…
L=Logic connection
R= result

5.6 PWM control

Type of control can be control as 1bit or 1byte.

1bit PWM(1-start/0-stop): The PWM start and switch ON by the value of receiving telegram “1” , and stop by “0”.

1byte(255-ON/0-OFF/other valve): the switch ON always by the value of receiving telegram “255”, the switch OFF by the value of receiving telegram “0”. The PWM runs and pulse width of PWM is set according to the value of receiving telegram (1 to 254)



1bit pwm control:valve=**0%(OFF)**
10%(26)
20%(51)
30%(77)
40%(102)
50%(128)
60%(153)
70%(179)
80%(204)
90%(230)
100%(ON)

1byte pwm control:valve= x (x:0..255)
X=0(OFF)
1..25(0%)
26..50(10%)
51..76(20%)
77-101(30%)
102-127(40%)
128-152(50%)
153-178(60%)
179-203(70%)
204-229(80%)
230-254(90%)
255 (ON)